Effect of Total Quality Management and Lean Manufacturing Practices on Operations Performance: An Investigation on North-Indian Manufacturing Organizations

Synopsis

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Submitted by

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1. Introduction

For any nation like India, the economy of the nation constitutes of three fundamental pillars the industrial division, service division, and agricultural division. India's financial improvement has started since its autonomy which comes about within the decay of the agricultural division from 57.41 percent in 1950-51 to 16.5 percent in 2020-21. On the other hand, the benefits segment has been booming appearing a positive slant from 28 percent in 1950-51 to 55.3 percent in 2020-21. The world is shocked by the flare-up of the outburst of pneumonia which developed from the Wuhan seafood marketplace, within the capital city Hubei area, china. The researchers have named it as severe acute respiratory syndrome coronavirus disease 2019. The bugs spread over 196 nations inside no time numerous of the provinces forced lockdown in arrange to contain the malady. Each and every division had a colossal effect on this shocking infection. Each widespread brings alter in technology, socio-financial components, and human conduct.

The ever-changing globalized markets have been posing demanding situations of competitiveness and survival to all production industries. Manufacturers are always embracing modifications and upgrades of their key activities or tactics to deal with demanding situations. Manufacturing organizations are under huge pressure to chase operational brilliance and improve their performance in order to reduce their price and provide goods of better quality in shorter lead times. To live competitively in this globalized market, it's essential to arise as more efficient. Hence industries have initiated the reorientation in their capabilities via the implementation of varied practices. Lean Manufacturing (LM) principles and Total Quality Management (TQM) techniques have been widely used by manufacturing organizations to attain this competitive advantage over their competitors.

Both TQM and LM received much recognition from experts and scholars in developing and developed nations. Researchers debated that Operations Management (OM) techniques such as LM and TQM, are applied distinctly in the organizations and there are good results for the integration among these methods that can optimize.

Quality Management initiated in manufacturing, and TQM, like its following practices, adapted well to healthcare, finance, and many other fields. Some of the milestone firms to implement TQM comprise Toyota, Philips Semiconductors and Ford. Total Quality Management is an

improvement technique to the outdated way of doing business. It is a verified method to guarantee the continued existence of any industry in world-class competition.

Around the world, nations such as The UK, Germany, Turkey and France built up TQM benchmarks. But by the 1990s, TQM was superseded by ISO (International Standards Organization), which got to be the standard for much of mainland Europe, and by another methodological reaction of the 1980s to quality concerns, Six Sigma. Nevertheless, TQM standards shape the premise for much of ISO and Six Sigma. Within the 2000s, the ISO overseeing body recognized TQM as a significant foundational philosophy. TQM lives on in data-driven strategies for a data-driven age.

Nichols says that TQM principles and tools obtain power not when an organization makes a committed quality office, but when the whole company is included in the pursuit of extraordinary quality. A case is the quality circle, in which employee's straight forwardly included in a process of brainstorm to find solutions. People are a marvelous asset that's habitually underutilized. The administration frequently doesn't recognize the esteem that they bring to the everyday workplace. Nichols proves that employees know how to solve problems. In addition to tapping a local asset, actualizing the TQM method can offer the following support to an organization:

Confirms consumer faithfulness and consumer satisfaction

Confirms income growth and developed productivity

Reduce inventory and waste

Improve strategy

Adapt to regulatory environments and changing markets

Boost market image

Eradicate waste and defects

More job security

Improve staff morale

Decrease costs

Growth in profit

Lean Production (LP) is a method that is centered on the reconfiguration of the producing structures via streamlining the tactics which facilitate waste reduction, minimizing versions and

thereby facilitating price reduction. Today, lean manufacturing is a production method that many manufacturers must track and incorporate into their systems (Wong, Ali 2009). This approach has been largely preferred in practice by successful companies in developed countries. As a result, lean Production practices are preferred all over the world to reduce waste and increase business efficiency.

In some parts of the world, the idea of "lean" is still relatively unknown or unpracticed. In recent years, developing countries like India have become more and more interested in lean production. In India, like other developed countries, the lean manufacturing process is slow. This is due to people's concerns about change, as well as the lack of knowledge and education about lean thinking and applications. Producers must now be proficient in this concept in order to effectively implementing LP techniques. Depending on cultural and country-specific factors, levels of awareness and knowledge about lean production terms may differ among countries.

The basics of lean Production employ continuous improvement processes to concentrate on the elimination of waste or non-value additional steps inside an organization. The challenge for organizations using lean manufacturing is to develop a culture that can create and sustain long-term commitment from top management to the entire workforce. The researchers all round the world were studied and commented on potential advantages of implementing lean manufacturing ideas, Total Quality Management practices and its effects on operational performance. Studies were additionally done to spot numerous factors that result in a successful implementation of TQM practices and lean principles. Being in a developing country, numerous Indian industries are struggling to be world class. Thence lean producing has been receiving plenty of attentions within the Indian trade. But the adoption of lean principles is found to be tough. Also variety of researches within the Indian context is incredibly few.

Integrated LM with TQM is a framework comprises of TQM with LM principles and is related to monetary and non-financial execution estimation indicators. The ultimate aim of this framework is to focus on accomplishing the total satisfaction of consumers by eliminating Muda (waste) present in an organization. Thus, there exists a potential scope to spot the link among lean factors, TQM practices and operational performance.

2. Research Plan Outline

The most prevalent process of improvement strategies are Total Quality Management and Lean Production which are gradually increasing and persistent (Caffyn, 1999). This combination also appraised as a world-class production strategy (Singh and Ahuja, 2013; Forza, 1995). As supporting techniques, this combination may provide picks up and advantageous competition to companies on the off chance that both are completely connected in uses (Ahujaand Singh, 2013; Andersson et al., 2006; Mosadeghard, 2013). This combination may increase client fulfillment through a philosophy of nonstop progress and worker interest (Dahlgaard-Park and Dahlgaard (2006). Thus, these practices should be used as a system for the combined overall benefits of the application (Ward and Shah, 2007).

The studies have recognized that the problem of combination is an obstacle to the simultaneous use of LP and TQM. However, these concerns have not been described or discussed thoroughly from an implementation perspective. One of these combination problems recognized is the need for association (Singh and Ahuja 2013; Reddy, 2013) to encourage because top management cannot fully implement, the need for a clear joint implementation plan and the inability of the organization to change the combination of effective associations and considerations Attitude. When TQM is viewed as a separate initiative, there is also a need for cooperative energy (Bhat and Rajashekhar, 2009). Ricondo and Viles (2005) also mentioned the main management problems in implementation, such as the struggle without priorities and clear implementation methods. These problems also stem from energy complexity, which is related to the high degree of interrelation and criticism between variables, including, for example, formal, project management and personal issues (Ricondo and Viles, 2005). Dahlgaard-Park and Dahlgaard (2006) highlighted that due to the similarities between concepts, the limitations of practices such as TQM and LP are not clearly defined. Furan et al. (2011) also highlighted that the idea of collaboration among these models is not yet clear, as it requires detailed experimental strategies to be tested. Chiarini (2011) also cited the necessity of tilting coordination rules and TQM. Therefore, future research should consider their common characteristics and contrastive views.

3. Lean & TQM: Operations Management Area, Comparison Theory along with their interconnectedness

Lean and TQM are one among the broad-based operations management vision strategies that need multi-functional execution & dynamic cycles just to improve adequacy & profitability (Gupta and Boyd, 2008; Jambekar, 2000). The field of operations management that transforms an input into output in the form of supervision has broadened its focus at the level of organization as a chain or network (Gupta and Boyd) that includes an interdependent framework of organizational structure, business form and management direction. Total Quality Management and Lean practices are part of trade forms that are considered one of the international standard production applications (Singh and Ahuja, 2013). A number of Operations Management books also include Total Quality Management and Lean practices as an integral part of the their methodology, for example, the books written by Greasley (2008), Slack (2010) and Porter (2009).

The Lean approach is a technique of development method which is one among the special applications of production that is explained through the "incessant search to eliminate waste" (Trent, 2008). Its direct effect is the faster delivery time and lower inventory (Bradley, 2012)). According to Sharma et al., (2016), the method lean means introducing additional prices for clients at a relatively low cost. Lean is also related to speed, technique accelerator and performance (Taghizadegan, 2006). Therefore, the main objective of Lean is to increase productivity, optimize available resources and reduce waste (Gomes et al., 2013), and even add additional prices to customers (Ayabakan and Eken, 2014). Lean is also considered as an integrated socio-technical system (Furlan et al., 2011; Anvari et al., 2011)

The origination of Lean is from the Toyota production system. With the further development of Ohno Toichi's Just-in-Time (JIT) concept, the term lean production has become famous around the world through the flagship, the device that changed the world. Womack and Jones (1996) also proposed the following five principles of lean thinking: (1) value stream, (2) value, (3) flow, (4) perfection, and (5) Pull.

Laurie Mullins (Organizational & Management Behaviour) interprets TQM by means of “the whole association's lifestyle”, dedicated to satisfying consumers through a process of continuous

improvement, as well as individual contributions (CIPS, 2012). This idea shows that the TQM is also a social professional approach, comprising delicate and tough views. Social or sensitive views are fixed on individuals on the board, who emphasize initiative, cooperation & preparation, and the contribution of workers. Professional or demanding views are once again focused on improving creative strategies and techniques (Anvari et al., 2011).

Total quality management is related to the collective assumption of standard teachers such as Juran, Crosby, Deming, and Feigenbaum (Ricondo and Viles, 2005). TQM improves and supports the quality of elements and forms to meet or exceed customer expectations (Furlan et al., 2011). As a management method, TQM includes six points which are: (1) process, (2) item, (3) system, (4) leadership, (5) people and (6) customer (Charantimath, 2011;Ho, 1999).

Many scholars have promoted the interconnection of Lean and TQM. For example, Singh and Ahuja (2013) documented the cooperative energy impact of TQM & Total Production Maintenance (TPM) as part of Lean. Cooperative Energy JIT-TQM also emphasized that Furlan and others treat JIT and TQM as lean groups. Furlan et al. (2011) also pointed out the relationship between TQM and lean thinking, believing that TQM has been enriched with lean practices aimed at reducing production differences. TQM and Lean also shared personal and senior management engagement, consumer loyalty, and continuous improvement ideas (Chiarini and Baccarani, 2016).

Khalili et al., 2018 also highlighted that TQM is considered a prerequisite for lean. In this case, TQM will be a lean tool and technique, considering that TQM contains laborious features, as well as different tools and methods, aimed at implementing lean principles. However, Andersson.et al., (2006) and Dahlgaard-Park and Dahlgaard (2006) differ from those of Khalili et al. (2018)

Regardless of whether TQM is an umbrella thought synchronized with them, TQM can be a management philosophy. When the latest theories and results like lean exhibit that a superior roadmap exists.

4. Problem Statement

This research work attempts to investigate the effect of Total Quality Management and Lean Manufacturing Practices on Operations Performance using North-Indian Manufacturing organizations.

5. Thesis Chapter Scheme

Majorly this research work will be divided into five to six chapters as follows:

Chapter -1: Introduction

Chapter -2: Literature Review

Chapter -3: Objectives and Methodology

Chapter -4: Data Collection and Data Analysis

Chapter 5: Results and Discussions

6. Literature Review and Gap Analysis

6.1 Total Quality Management

TQM is a method of executing the quality techniques and tools to enhance product and processes value continuously. Persistent improvement activity expands the products quality and fulfills clients need. Any automotive organization serves a large number of customers, so understanding customer prerequisites is a factor of TQM and helps to discover the latest customer needs.

The best implementing practices of an organizational customs values positively impacted the vital success factors of TQM and quality improvement, improved the clients satisfaction and performance of hospital services (Kaluarachchi, 2010). In George and Katerina, 2007 paper it was observed that, the International Standards Organization 9000 confirmed the influence of authorized exposures, and additional actions by TQM will improve quality and lead to the development of outstanding manufacturing subsidies.

Henrik and Rickard (2005) conducted a background analysis to understand whether interest in quality honour measures is appropriate. Participation in quality reward practice strengthened the quality development practice and achieved quality rewards. Measuring the performance of a company's products, services, or processes against those of another business Benchmarking .The benchmarking method is one of the TQM technologies, discussed in a study (Md Zairi and Simmy, 2008),which showed that benchmarking visits are a cost for the company and therefore must be considered and executed with extreme caution to achieve expectations of the result.

Uppalapati Kiran et al., (1995) through their hypothetical examinations observed that joint execution of JIT and TQM in the enterprises are outperforming in improving the quality of items and

cycles as well as consumer satisfaction. Ooi Keng boon et al., (2006) led contextual investigation to know the affinity of workers to remain in the TQM Company. It was discovered that by proper training the employees on TQM components, there is no way of leaving workers from the current organization because of the TQM execution measure. Md Zairi (1994) led same contextual analyses at various organizations reaches from automobile industry, Xerox organizations to service organization etc; on position of authority in TQM usage measure, Tracked down that the solid initiative practices helped the different association in improving the performance and quality, through effectively applying TQM.

Christos and Evagelos, (2009) directed a contextual investigation of businesses at Greek to know the degree of use of TQM instruments and method and to know the degree of training given to the workers to improve their performance quality. Maximum , the majority of the Greek enterprises (manufacturing, corporate and service) are small in size, having ISO 9000 confirmation were energetically using TQM techniques and tools and preparing their workers on TQM theory to upgrade their efficiency and improve their quality of items and cycles. These small businesses are practicing basic TQM techniques and tools; to acquire the consumer satisfaction and competitive excellence.

Hsuan-Kai Chen et al., (2004) directed a contextual investigation at Taiwan drug enterprises to apply the TQM philosophy. With a thorough literature survey they found CSF's and TQM techniques and tools used adequately and effectively. During the execution they confronted the different hindrances, for example, lack of management support, lack of cooperation between the employees, lack of understanding teambuilding approach etc. The drug enterprises are effectively executed TQM and acquired competitive strength, increase in production, reduction in quality expenses and increased sale and benefits. With this broad literature review it was discovered that usage of TQM components assumes crucial part in acquiring the competitive excellence and consumer satisfaction.

6.2 Lean Manufacturing

The foundation of lean Manufacturing method is Toyota production system. Initially Massachusetts Institute of Technology in 1990 introduced Lean to the world to redefine Toyota production method as the lean manufacturing technique (Yadav et al., 2010). Lean is a method of

minimizing costs while continuously refining the quality of various manufactured products and services, thus increasing consumer satisfaction (Womack and Jones, 2010).

The term leanness provides the lean estimate, and many researchers have expressed this in various ways. Lean is defined as the impact of different lean tools and applications used in the industry's lean demonstration (Vimal and Vinodh, 2012). (Soriano and Forrester, 2002) also interpreted leanness as the degree of commitment to lean production. Lean is more extensive in this field. It goes beyond the use of lean tools and practices, and extends more or less to all operational characteristics of the business, including planning, growth, maintenance, excellence and safety (Singh et al., 2010).

In their influential work, Ward and Shah (2003) defined lean manufacture as a all-around approach that comprises a wide range of managing practices such as just-in-times, quality systems, work groups, cellular producing and supplier management. In opinion of many authors, the main emphasis of lean production is that these practices can work synergistically to make more efficient, better quality organization that manufacture refined products at the speed of consumer requirement with least or no waste.

It can be understand from this description that a extensive variety of the lean practices can be clustered into uniform sets which plan to achieve a particular goal associated with implementing lean such as removal of waste, quality conformance, demand management and reduction of costs. Ward and Shah (2003) illustrated 22 lean methods as the elements of lean production. Significant lean methods that the researchers recognized are set-up reduction, quick changeover techniques, statistical process control, Kanban, supplier association, non-stop improvement, quality administration, Total Productive Maintenance (TPM), perfect systems, standard working procedures, and mixed model production. The researchers clustered lean practices into four key lean principles: TPM, TQM, HRM (Human Resource Management) and JIT (Just-in-Time).

Lean is explained as the level of excellence in the mapping of the value stream (Wan and Frank, 2008). Lean is the degree to which waste removal activities, continuous improvement, and zero failures are achieved. Lean is described as the degree of muda disposal due to unnecessary procedures, unproductive actions, and extreme inventory accumulation (Hallgren et al., 2009).

Lean concepts first started in the 1980s as an operational phase of the automotive sector. After effectively implementing lean thinking, Toyota has surpassed General Motors, Engines, Ford and Chrysler to become the largest auto manufacturer. Today, the lean frame is beginning to gain global recognition among various companies including the government, and its mission is the same as Toyota admired (Rich and Piercy, 2009). Compared with ruthless production in the process industry, the lean manufacturing framework is considered more reliable for distinct manufacturing. However, there is evidence that the lean production framework is being effectively implemented, such as synthetics & drugs, and great progress has been made (Gopal Raj et al., 2007).

7. TQM and Lean Manufacturing Association

Researchers argued that TQM which consists of firm characteristics including the diverse techniques and tools is designed to apply LM philosophy (Vinodh and Joy, 2012). In general, both LM and TQM have similar objectives which are waste removal, improving efficiency and the nonstop improvement (Teeravaraprug et al., 2011). Wilson (2013) discussed that if TQM is cautiously put into operation along with a Kaizen event, it leads to full satisfaction of consumer and that it is considered among the significant tools that are frequently used to facilitate the execution of the Kaizen method which is a main Lean manufacturing factor.

Lee (2012) inferred that there is an absence of writing examining the concurrent effect of lean creation and TQM on operational performance. The investigation conducted by Anvari et al. (2011) uncovered that TQM and LM share much for all intents and purpose. An integrated TQM with LM is a framework which contains their principles. This framework emphasizes in accomplishing total customer fulfillment by eliminating eight wastes present in any process in an organization (Salleh et al., 2015). As indicated by Folinas and Faruna (2011) the two tools lean approach and TQM have one thing in common, which is the consistent improvement to provide better value the consumer. Ramasamy (2012) expressed that there is no argument that Kaizen (which is LM tool) is a part of TQM. Besides, he inferred that LM contains some good ideas; every one of them is strategies/principles of TQM. Nonetheless, TQM is the superset incorporating Lean manufacturing.

According to Pont et al. (2008), Lean manufacturing theory advocates TQM as an approach pointed toward reducing process of manufacturing variance. They found that JIT and TQM have an

immediate and beneficial effect on operational performance. These bundles confirm their roles as the pillars and cornerstones of LM.

8. Finding of Lean Strategy and Application

Mostly, the impacts of 5 most important lean application were discussed within the research papers, for example, pull production framework, heijunka, non-stop progress, total productive maintenance (TPM) and material- and information-flow mapping (value stream mapping (VSM)) of lean performances on modern measures. Discoveries demonstrated that heijunka has shown the most powerful effect on operational application, accompanied with nonstop progress, total productive maintenance (TPM) and material- and information-flow mapping. Exploration presented genuinely demonstrated proof of relation between lean application and operational execution. Exploration could be useful in enhanced lean strategy and best selection of lean tools (Belekoukias et al., 2014).

Yadav and companions interpreted lean application for a system as total eradication of muda (waste), anywhere it presents. Well organized exchange of goods, facts and all round nonstop progress of the organization were mentioned an important significant lean applications to attain excellence (Yadav et al., 2010). To achieve the desired leanness level the cellular manufacturing, Kaizen and poka-yoke were mentioned as significant lean applications (Womack and Jones, 2010). As per a recent 2014 survey performed, lean outline map was build up to describe the realities of structure of lean execution (Sundar et al., 2014). Non-stop progress was also suggested as an important lean application. The objective of non-stop progress can be fulfilled by suitable training, early process issues identification, correct proper improvement of thought management, and satisfactory award and acknowledgment framework (Holtskog, 2013). A variety of lean execution application such as Poka-yoke, Five S, VSM, Kanban, Just In Time etc were examined for adapt shaft creating organization. Value Stream Mapping was distinguished as main lean practices in many industrial environments (Nallusamy, 2016). Significance of takt time practice was stressed through VSM in order to match the requirement with production to attain production excellence and intense perfections in the production of machine tool division SMEs (Ricondo et al., 2016). 5S, Kanban and VSM have been effectively used to decrease waiting time in process stock in Indian style businesses, resulting in major progress in the production (Saraswat et al., 2015). VSM in accordance with other lean devices such Ishikawa and

5S chart remained effectively connected in wellbeing care items to diminish wait time and in process stock within framework (Martin and Tomas, 2015). Simulation along VSM was effectively implemented to draw lean manufacture organization for windows and doors manufacturer subsequent job store manufacturing organization (Gurumurthy and Kodali, 2011)

9. Aims and Objective of the Study

This study will be performed with the following aims and objectives:

1. To investigate the present situation of TQM and Lean Manufacturing Practices by North Indian Manufacturing organizations
2. To explore the challenges in adopting TQM and Lean Manufacturing Practices by North Indian Manufacturing organizations
3. To determine the effectiveness of TQM and Lean Manufacturing Practices on Operations Performance by North-Indian Manufacturing organizations
4. To identify sustainable solutions for TQM and Lean Manufacturing Practices on Operations Performance by North-Indian Manufacturing organizations

10. Hypotheses of the Study

The hypotheses of the study are as follows:

Hypothesis 1: Present Situations of TQM and Lean Manufacturing Practices by north-Indian Manufacturing organizations

Hypothesis 2: The challenges in adopting TQM and Lean Manufacturing practices by north Indian Manufacturing organizations

Hypothesis 3: The effectiveness of TQM and Lean Manufacturing practices on Operations Performance by North-Indian Manufacturing organizations

Hypothesis 4: The sustainable solutions for TQM and Lean Manufacturing Practices on Operations Performance by North-Indian Manufacturing organizations

11. Data Collection and Research Methodology

Under this classification, a ton of research work is required and included by diverse headings. It contributes assortment of the multitude of realities, facts, figures and assumptions to be attempted in

figures for the statistical manipulation of the issue. Data for the proposed research exploration will be gathered essentially from primary sources through questionnaire survey and follow the .Research methodology and design as given in figure 1

1. The study will be broken down into various phases. The first stage entails a thorough review of the literature to assess the existing scenario of TQM and Lean Manufacturing Practices by North-Indian Manufacturing organizations
2. The stage two attempts to evaluate the understanding and spreading of lean and TQM principles, techniques and tools within organization. This will highlight the challenges in adopting TQM and Lean Manufacturing practices by North-Indian Manufacturing organizations. For this reason, a survey will be conducted with the use of organized questionnaires through manufacturing industries.
3. The third phase focuses on the role of TQM and Lean and how it can affect the success of effectiveness of TQM and Lean Manufacturing Practices on Operations Performance by North Indian Manufacturing organizations. For this, a questionnaire survey will be conducted to assess the effect of various aspects on Operations Performance and how this may affect the introduction and adoption of combined lean and TQM strategy in manufacturing.

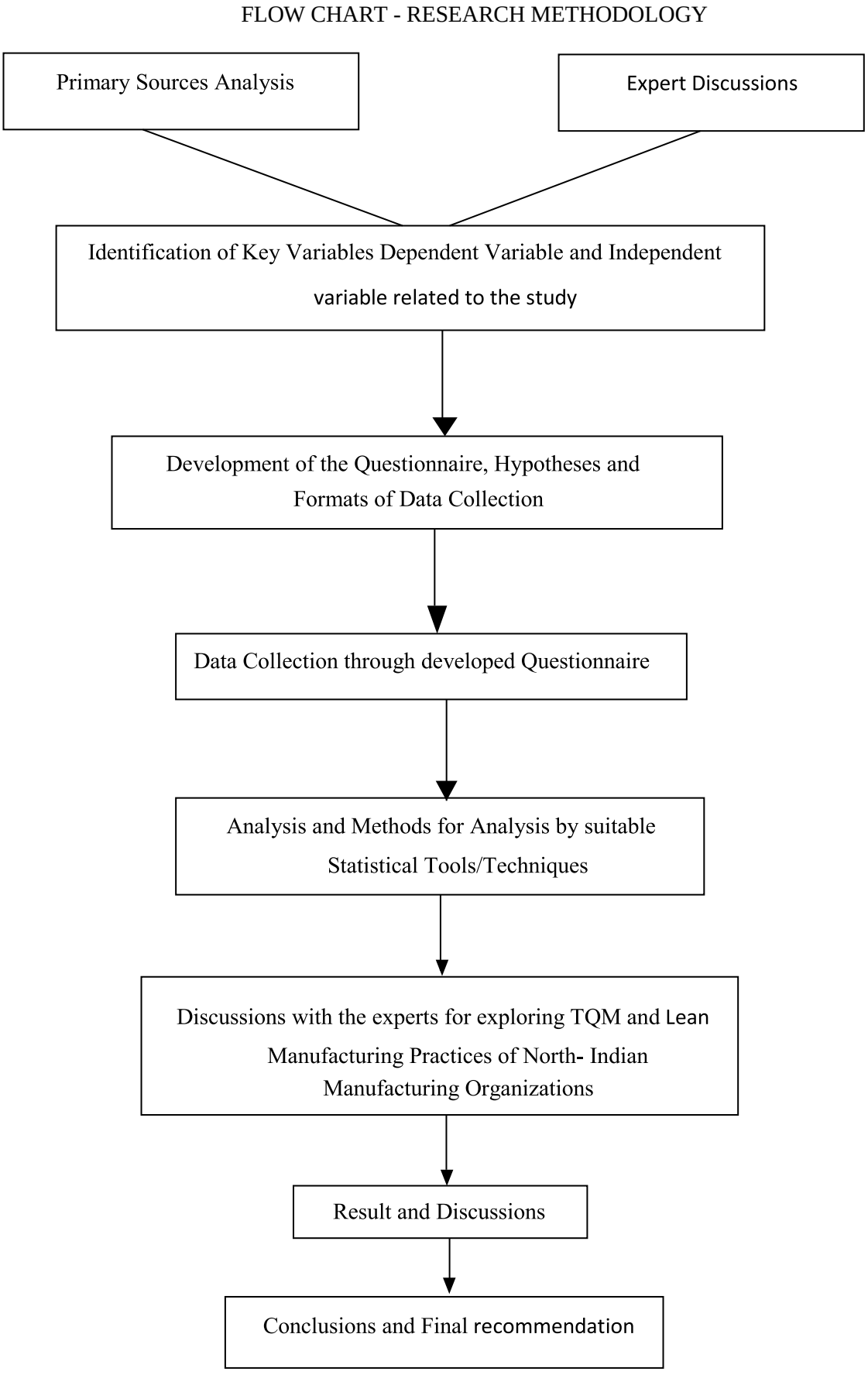
FLOW CHART - RESEARCH METHODOLOGY
Primary Sources Analysis
Expert Discussions
Identification of Key Variables Dependent Variable and Independent variable related to the study
Development of the Questionnaire, Hypotheses and Formats of Data Collection
Data Collection through developed Questionnaire
Analysis and Methods for Analysis by suitable Statistical Tools/Techniques
Discussions with the experts for exploring TQM and Lean Manufacturing Practices of North- Indian Manufacturing Organizations
Result and Discussions
Conclusions and Final recommendation

Figure 1. Research Methodology and Design

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